



Stuthridge is an ergonomist and social scientist employed by the National AgrAbility Project, based in the Department of Agricultural and Biological Engineering, and also aids the US Federal Occupational Health Service as an ergonomics consultant and trainer. His special interest is the identification and elimination of barriers that limit the participation in the workplace of people with diverse abilities and functional capacities. He holds a B.Sc. in Sociology, Politics, and Economics, and an M.Sc. in Health Ergonomics. His Ph.D. from Purdue University investigated the social, cultural, and economic factors that influence the attention given by designers to the usability of assistive technology for use in agricultural settings. At Purdue, he teaches on disability and discrimination, as part of the University's diversity program. He had published numerous articles on ergonomics, and on the social and political factors that shape institutional approaches to disability, and to occupational health and safety. He is a member of the Human Factors and Ergonomics Society.



## Dissertation Defense

**Speaker:** Robert W. Stuthridge

**Title:** The consideration of usability in the process of designing assistive technology for use in agricultural settings.

**Major Professor(s):** William E. Field

**Date:** Tuesday, January 24, 2012

**Time:** 10.00 a.m.

**Location:** ABE 212

### Abstract:

Farming and ranching are hazardous, often arduous, occupations undertaken by a demographically varied population which suffers a higher than average prevalence of permanently disabling conditions. More than seventy percent of people with disabilities who work in agriculture choose to modify their tasks and work environment using "assistive technology" (AT) to enable them to continue working in this sector. AT is usually designed to meet the functional capacity only of its intended user (the "primary user"). In agriculture, however, AT may also be used by co-workers ("secondary users"). It is not known whether AT used by secondary users is optimally designed to be usable by these people. A failure by AT designers to consider whether AT is usable by all users may inadvertently increase risk of injury for users for whom it is sub-optimally designed.

This study investigated the process by which AT is designed for use in agricultural settings. Through the collection, analysis and coding of data generated from observations of AT design meetings, from interviews with designers of agricultural AT, and from design resources cited by designers, a grounded theory of "the consideration of usability in the process of designing AT for use in agricultural settings" emerged.

The theory states that certain factors, both intrinsic and extrinsic to designers and users of agricultural AT, influence the consideration given during the design process to the utility and usability of AT. In particular, the influence of these factors results in a dichotomous imbalance between utility and usability, with utility having priority, while usability may be neglected. The task-orientedness of agricultural users of AT is an important factor in this phenomenon, inclining designers and users of AT to judge its success by its utility, rather than by its usability. The potential for designing usable AT is also undermined by the adoption of an exclusive, "ergonomics-for-one" design paradigm, which focuses strongly on meeting the needs of the primary user, while neglecting the potentially adverse effect that a modified task might have on other, "secondary users."

The need to raise awareness of usability during the design process led to the development of an "Agricultural AT Design Process (Usability) Checklist." The checklist was subjected to heuristic evaluation and field testing, and is presented in this dissertation. The study's methodological challenges, its implications for the AT design process, its potential applications, and areas for further research are also discussed.

### Application:

The checklist developed through this study will aid designers in protecting the health and safety of all agricultural workers who are directly or indirectly affected by the provision and use of assistive technology. The study also indicates fruitful avenues for professional training courses for anyone engaged in the design of work, both for disabled workers and their co-workers. It therefore has particular relevance for professional working in the fields of occupational therapy, physical therapy, assistive technology, and rehabilitation ergonomics.